浙江大学湖州研究院
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Artificial Intelligence and Robotics Education Research Center

NASHENBOT

Textbook

AI Programming and Mathematical Interests

Artificial Intelligence Educational Robot Course

NASHENBOT

AI Robot Programming and Interest in Mathematics

Volumn 1

Compiled and Edited by Artificial Intelligence and Robotics Education Research Center,
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Contents

01 My Robot Friend

AI and STEAM	Knowledge points
Technology and Engineering Robot Building	1. Varieties of robots and their composition 2. Usage of motor modules 3. Downloading and running programs
Course tasks	**Course duration**
Build your robot Interactive experience	90-120 Minutes

Scenario introduction(10 min)

1. Guide students to understand robots:

Hello, little friends! Do you have good friends at school? Let's share our good friends with each other! Today, the teacher is going to introduce a new good friend to you, and he is a robot. What kind of robots have you seen before? What can the robots do?

When it comes to robots, what may come to your mind are humanoid robots in science fiction movies, with highly intelligent brains, flexible hands and feet, performing difficult tasks for humans. I believe you have seen many movies of this type, such as "Terminator", "Transformers", "I, Robot", "The Matrix", and so on.

However, "robot" is a general term that refers to a machine device that automatically performs tasks. It can either accept human commands, run pre-programmed sequences, or execute tasks based on principles formulated by artificial intelligence technology. Its tasks are to assist or replace human work in industries such as manufacturing, construction, or hazardous work. Below are five types of robots. Let's guess what they are used for?

Industrial robots

Educational and entertainment robots

Household robots

Service robots

Military robots

What do they look like? Yes, some robots don't resemble us humans, while some do. They can walk, talk, and come in different appearances. Today, the little friend we are meeting comes from a faraway planet, and his name is Nana.

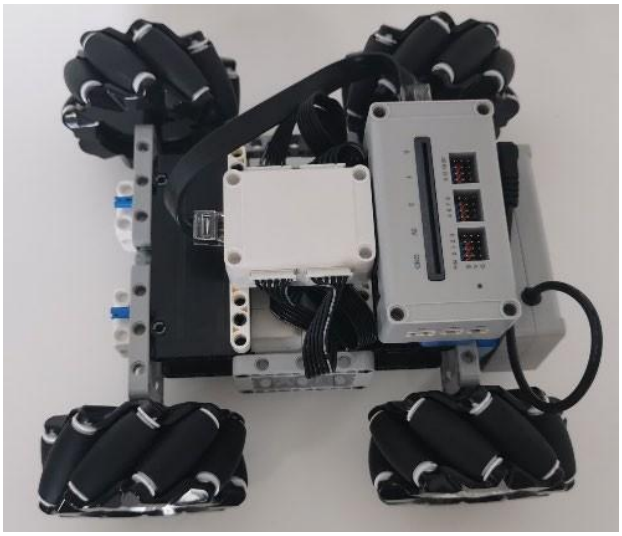
2. Guide students to hands-on practice assembling robots

Nana accidentally fell down in front of the portal on the future planet and fell through it. When it woke up again, it found its body scattered all over the place. Would the children like to help Nana return to its complete form and grow up happily with us? Briefly describe the names and functions of each part, and ask students to think about how to assemble them.

Analysis and Production (50 minutes)

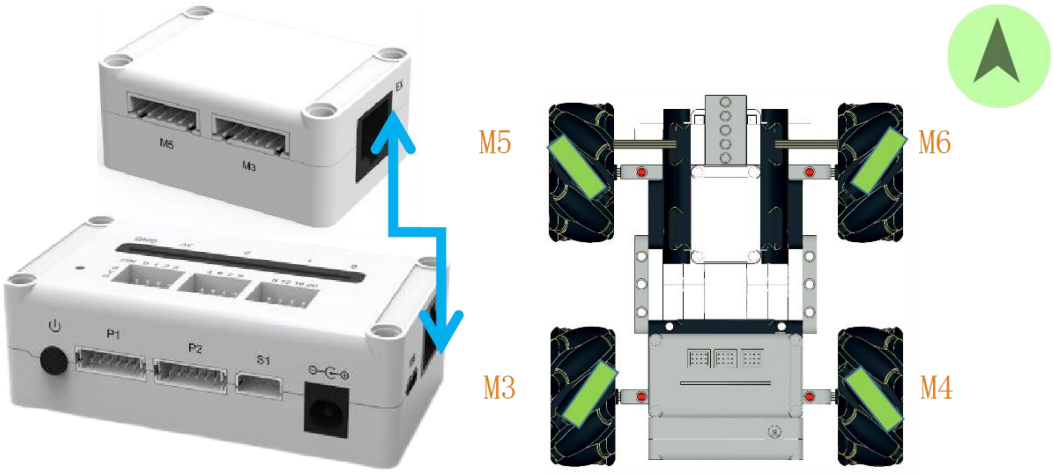
First challenge: Build your robot Nana.

Today's goal is to become friends with the robot Nana, but Nana still needs to be built by the children. Let's take a look at what he looks like.



This is what Nana looks like. Isn't he handsome? Do you know what body parts we humans are composed of? Nana is also made up of various parts. In the following time, let's briefly get to know the composition of our robot friend Nana's body! Nana's brain is actually our controller, which can run programs; the body part is built using four coded motors. Now, may I ask, which part is Nana's leg? Then you can follow the teacher to build Nana, and let's see who can build their Nana the fastest.

Part list



Cable connection tips

*Note: detailed instructions for building can be found in the attached document

Please make sure that the interfaces of the controller are correctly matched. Carefully check which port connects to which motor, which sensor and which battery, as incorrect connections may cause Nana to behave unexpectedly. For example, it may move backwards or to the left when you ask it to move forward.

The installation direction of the Mecanum wheels needs to be noted. They should be installed in a diagonal cross pattern, which means that the lines of all the wheels should point towards the center. Only when the Mecanum wheels are properly aligned can Nana move accurately (as shown in the green part of the image above).

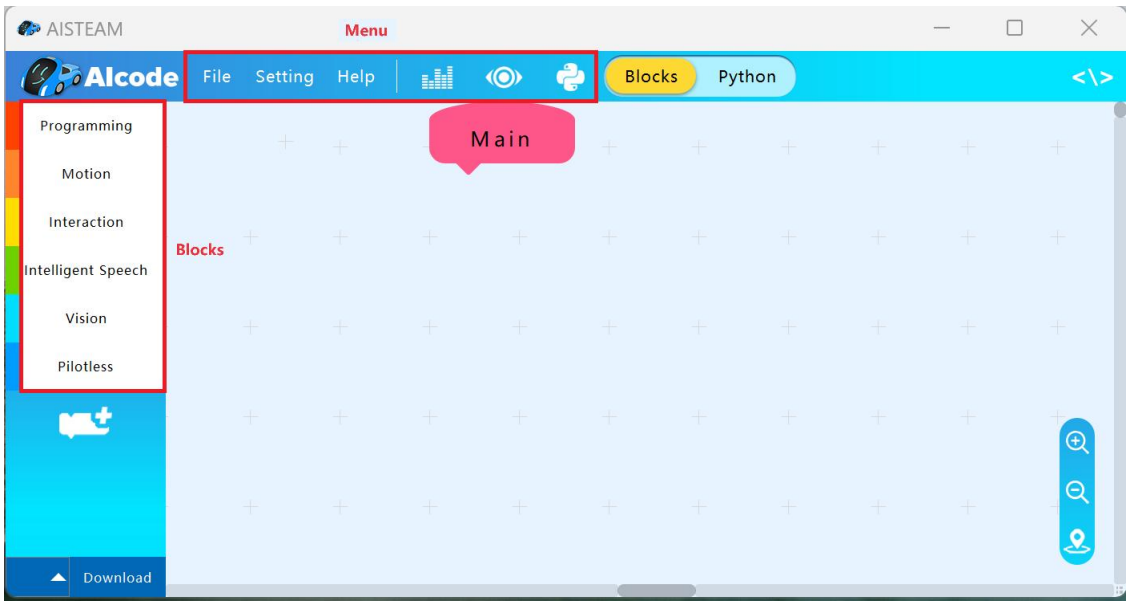
Reflection and Optimization (20 minutes)

Second challenge: Interactive experience

Scenario: Children have successfully assembled Nana's body, and Nana is very grateful to everyone and is willing to become friends with us and play with us. So what games can Nana play with us? How can it move? Can it move according to our ideas?

Just like how our brain gives instructions to our body parts and the body follows the instructions to move, for example, when the brain says "I want to sit down," the body performs the action of sitting down. Nana works the same way. Let's follow the teacher to see what's going on inside Nana's brain and how it gives instructions to its body.

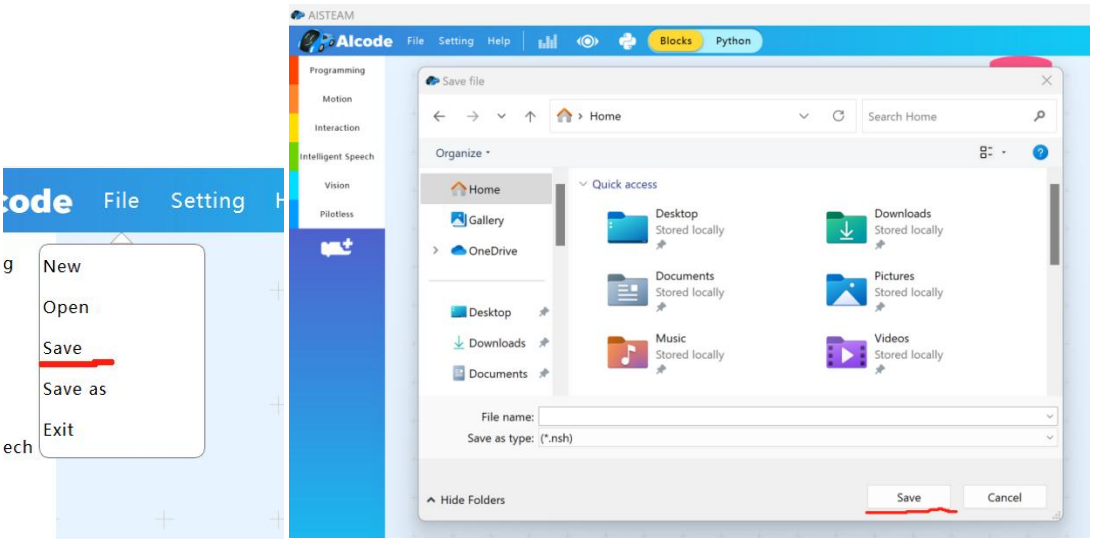
Nana's brain is hidden inside a computer, and its movements are controlled by the instructions we write. Let's learn about Nana's control methods together.



AIcode Interface

The blue bar at the top is the menu bar. We can see that the last module on the bottom left is the download button. After writing the program, it needs to be transferred to Nana's brain through the download cable. On the left side is the blocks module library. First, observe which blocks module library we can choose if we want Nana to move (Answer: Motion Control). We will gradually use each blocks module in the subsequent learning process. The middle part is the program creation area. The blocks modules pulled from the blocks module library need to be placed below the main program in the middle to achieve the programmed functions. Students need to pay attention when dragging the blocks modules.

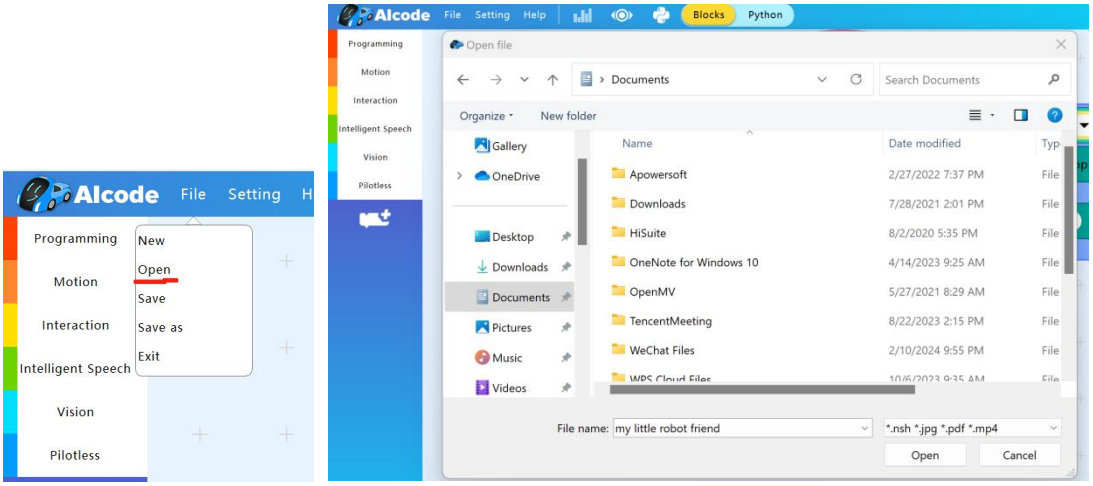
If the programmed instructions are not saved, they will be lost. What should we do in this case?



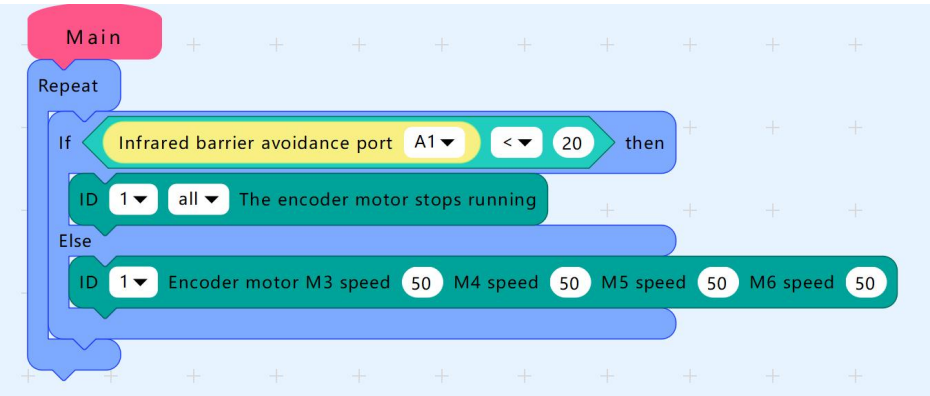
Save program

Click on the menu bar at the top, select File -> Save -> Save Location, then you can save the program.

Next, let's try to interact with Nana. To make Nana move, we need to write a program in the program creation area. For this lesson, we'll use a pre-written program by the teacher to interact with Nana. Let's see how to open the already written program.



Open file



The opened program file

Click on the menu bar at the top, select File -> Open -> Open Location, and you can open the program.

After downloading the program, how do we run it on Nana?

Let's learn about the basic operation methods of the controller.

Steps:

Turn on: Press and hold the button for about 1 second in the off state;
Shut down: Press and hold the button for about 1 second in the power-on state;
Select program 1: short press once;
Select program 2: short press twice;
Select program 3: short press three times;
Exit the program: short press once.

Here's a program prepared by the teacher. Please follow the teacher to open it and download it to Nana's brain. This program is designed to make Nana stop or turn when encountering obstacles (an infrared obstacle avoidance sensor can be added to Nana's body).

Extended Exploration (10 minutes)

The school is preparing to hold a relay obstacle race where the track will be taped on the ground. Some children will use balls to guide Nana along the track, while others will navigate the randomly placed obstacles on the course and continue forward. Everyone can form teams and compete to see who reaches the finish line first.